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Body weight gain and feed intake of broiler chickens fed different feed supplements

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Abstract

A feeding trial was conducted to evaluate the effects of Organic Mineral Mixtures, Probiotics, Enzymes, Emulsifier and Liver Supplements on Body Wt. Gain and Feed Intake parameters of broilers. For this purpose, a total of 396 day-old commercial broiler chicks (Cobb) were used and randomly allocated into 11 groups with three replicates of 12 chicks each. The results revealed that at 21st and 42nd days Body Wt. Gain values in all the treatment groups were significantly ($P<0.05$) higher than T₀ (control) group except T₇ and T₈. At 21st and 42nd days Feed intake values in all the treatment groups were significantly ($P<0.05$) lower than T₀ (control) group except T₆ while whereas it increased significantly in T₇ and T₈ groups.

Keywords: Organic mineral mixture, probiotic, emulsifier

Introduction

Poultry is one of the fastest growing segments of the agricultural sector in India with compound growth rates of 6% and 10% per annum in egg and broiler production. Globally, India ranked 3rd in after China and USA with a production of 88.1 billion eggs (2016 – 2017) and 6th after USA, China, Brazil, Mexico and Indonesia with a production of 3.46 million tons of chicken meat (BAHS, 2017). The per capita consumption of eggs and meat is about 69 eggs and 3.4 kg meat per person per annum in India. In the country, eggs and broilers has been shown to rise at a rate of 8 – 10 per cent per annum. The poultry sector in totality accounts for 0.60 per cent of the national GDP (2017–2018). As per FAOSTAT (2016), world's per capita consumption of poultry meat has increased from 2.88 kg to 14.13 kg over the last five decades. Poultry meat is an excellent source of high quality protein, vitamins, and minerals and is not subjected cultural and religious restrictions. Broiler meat is rich in nutrients primarily as a source of protein (21.4g/ 100g) with fewer calories (119 kcal/ 100g). Organically complexed minerals may provide alternative pathways for absorption, by decreasing mineral excretion. Organic trace minerals (OTM) supplementation to broiler diet is not directly associated with improved broiler performance, a single or blend of OTM in diets has been shown to have multiple beneficial effects. Probiotics are live microbial feed supplements which beneficially affect the host poultry birds by improving its intestinal microbial balance (Isolauri *et al.*, 2004) [5]. *Lactobacillus spp*, *Saccharomyces cerevisiae* and *Bacillus coagulans* have been used as a source of probiotics for improving growth performance. Poultry naturally produces enzymes which help in digestion of feed nutrients. The benefits of using enzymes in poultry diets include not only enhanced bird performance. Poultry produce emulsifiers in the form of bile however it is at times insufficient in view of added fats and oils. Hence, addition of emulsifier from external sources becomes obligatory in poultry feed. Broilers fed the diet containing soybean oil and emulsifier presented higher body weight gain. Liver stimulants possess hepato – protective and hepatogenic properties, tone up liver resulting into increase utilization of nutrients and hence better performance. Keeping the above facts in view, an experiment was conducted to determine the effect of supplementation of organic mineral mixtures, probiotics, enzymes, emulsifier and liver stimulants on the body weight gain and feed intake parameters of broilers.

Materials and Methods

A total of 396 day old commercial broiler chicks (Cobb) were procured for conducting the experiment. All the chicks were individually weighed and randomly allotted to eleven different groups each with three replicates of 12 chicks.

Average Body Weight of chicks was similar for all the treatment groups. All the Housing and Management conditions were similar for different treatment groups in the experiment. The groups were designated as T₀; Basal diet, T₁; Chicks fed basal diet along with Organic Mineral Mixture 1 (Organomin Forte) @ 0.5 g per kg feed, T₂; Basal diet along with Organic Mineral Mixture 2 (Vannamin) @ 0.5 g per kg feed, T₃; basal diet along with Probiotics (Microguard) @ 0.1g per kg feed, T₄; Basal diet along with Enzymes + Probiotics (Brozyme -XPR) @ 0.5 g per kg feed, T₅; Basal diet along with Emulsifier(Lipigon) @ 0.5 g per kg feed, T₆; Basal diet with 3% less energy, T₇; Basal diet with 3% less energy along with Liver Stimulant1(Superliv Premix) @ 0.5 g/kg feed, T₈; Basal diet with 3% less energy along with Liver Stimulant 2 (X- Liv Pro) @ 0.5 g/kg feed, T₉; Basal diet along with Enzymes with Probiotics (Brozyme - XPR) and Liver Stimulant 1(Superliv Premix) @ 0.5 g/kg feed, and T₁₀; Basal diet along with Enzyme with Probiotics (Brozyme - XPR), Liver Stimulant1(Superliv Premix) and Emulsifier (Lipigon) @ 0.5 g/kg feed. All the chicks were weighed individually from all groups at weekly intervals to obtain week wise body weights. The average value of body weight gain under each treatment group was then calculated. The experimental data obtained were analyzed statistically using Completely Randomized Design (CRD) as per the methods given by (Snedecor and Cochran, 1994) [9]. The significant mean differences between the treatments were determined by using Duncan's Multiple Range Test (DMRT) as given by Kramer (1957) [7].

Results and Discussion

Body Weight Gain

The average body weight gain of broilers obtained at weekly interval, starter, finisher as well as overall period are presented in Table 1 and Fig.1

Starter Phase

During the starter phase the body weight of broilers grew

rapidly with significantly higher body weight gains obtained in all the treated groups as compared to control group at the end of third week except T₇ and T₈ groups.

Finisher Phase

Similar trend in body weight gains was observed in finisher phase also with significantly higher body weight gains observed in all the treated groups than the control except T₇ and T₈ groups.

Overall Body Weight Gain

The overall (I - VI week) mean values for body weight gains of broilers were 1852.50 ± 0.31, 1937.30 ± 0.38, 1940.10 ± 0.56, 1993.40 ± 0.20, 2014.90 ± 0.24, 1950.20 ± 0.80, 1760.40 ± 0.28, 1848.60 ± 0.81, 1857.80 ± 0.73, 2063.90 ± 0.25 and 2120.30 ± 0.99 g in T₀ to T₁₀ groups, respectively. The overall body weight gains at the end of 6 week of age showed significantly higher values in all the groups as compared to control group except T₇ and T₈ groups. The maximum body weight gain of 2120.30 ± 0.99 g (14.45% more than control) was observed for T₁₀ where all the supplements (Probiotics, Enzymes, Emulsifier and Liver stimulants I) were added in the basal diet followed by T₉ (2063.90 ± 0.25), T₄ (2014.90 ± 0.24), T₃ (1993.40 ± 0.20), T₅ (1950.20 ± 0.80), T₂ (1940.10 ± 0.56), T₁ (1937.30 ± 0.38), T₈ (1857.80 ± 0.73) and T₀ (1852.50 ± 0.31). The Minimum body weight gain of 1760.40 ± 0.28 g was observed in broilers of T₆ group. There were no significant differences in body weight gains among T₀, T₇ and T₈; T₁, T₂ and T₅; T₃ and T₄ group of broilers. These findings were similar to Khaksefidi and Rahimi (2005) [6], Alkhalf *et al.*, (2010) [11], Aluwong *et al.*, (2012) [2] and Yadav *et al.*, (2018) [10] who also found significant increase in body weight gains of broilers with the dietary supplementation of probiotic (*Lactobacillus acidophilus*), probiotic (*Pediococcus acidilactici*), yeast (*Sacchromyces cerevisiae*) and probiotic (*Bacillus subtilis*) respectively.

Table 1: Effect of Feed Supplements on Body Weight Gain of broiler chickens

Treatments	Body Weight Gain (g) / broiler / week						Overall
	Starter			Finisher			
	I	II	III	IV	V	VI	
T ₀	75.57 ^a ± 0.79	186.49 ^a ± 0.63	297.73 ^a ± 0.73	408.37 ^a ± 0.53	427.36 ^a ± 0.65	456.98 ^a ± 0.81	1852.50 ^a ± 0.31
T ₁	78.63 ^b ± 0.68	194.66 ^b ± 0.48	310.85 ^b ± 0.51	427.47 ^b ± 0.65	446.80 ^b ± 0.66	478.89 ^b ± 0.58	1937.30 ^b ± 0.38
T ₂	78.47 ^b ± 0.48	195.43 ^{bc} ± 0.72	311.58 ^{bc} ± 0.70	427.64 ^{bc} ± 0.45	447.01 ^{bc} ± 0.48	479.97 ^b ± 0.84	1940.10 ^b ± 0.56
T ₃	80.60 ^c ± 0.50	200.64 ^c ± 0.73	319.82 ^c ± 0.50	439.74 ^c ± 0.67	459.57 ^c ± 0.70	493.03 ^c ± 0.72	1993.40 ^c ± 0.20
T ₄	81.68 ^c ± 0.60	202.64 ^{cd} ± 0.63	323.70 ^{cd} ± 0.72	444.49 ^{cd} ± 0.74	464.61 ^{cd} ± 0.70	497.78 ^c ± 0.57	2014.90 ^c ± 0.24
T ₅	79.25 ^{bc} ± 0.66	196.52 ^{bc} ± 0.78	313.61 ^{bc} ± 0.83	430.39 ^{bc} ± 0.69	449.54 ^{bc} ± 0.67	480.89 ^b ± 0.67	1950.20 ^b ± 0.80
T ₆	71.55 ^f ± 0.65	177.44 ^f ± 0.73	282.72 ^f ± 0.58	388.48 ^e ± 0.61	405.73 ^e ± 0.45	434.48 ^d ± 0.79	1760.40 ^d ± 0.28
T ₇	74.92 ^a ± 0.58	185.70 ^a ± 0.43	296.86 ^a ± 0.63	407.67 ^a ± 0.51	426.64 ^a ± 0.78	456.81 ^a ± 0.77	1848.60 ^a ± 0.81
T ₈	75.61 ^a ± 0.69	186.50 ^a ± 0.50	298.66 ^a ± 0.77	409.75 ^a ± 0.58	428.61 ^a ± 0.74	458.67 ^a ± 0.56	1857.80 ^a ± 0.73
T ₉	83.64 ^d ± 0.66	207.55 ^d ± 0.59	331.67 ^d ± 0.78	455.33 ^d ± 0.82	475.75 ^d ± 0.56	509.96 ^e ± 0.69	2063.90 ^e ± 0.25
T ₁₀	85.68 ^e ± 0.45	213.62 ^e ± 0.85	340.64 ^e ± 0.76	467.51 ^d ± 0.53	488.47 ^d ± 0.45	524.38 ^f ± 0.82	2120.30 ^f ± 0.99

Means bearing different superscripts in a column differ significantly ($P < 0.05$)

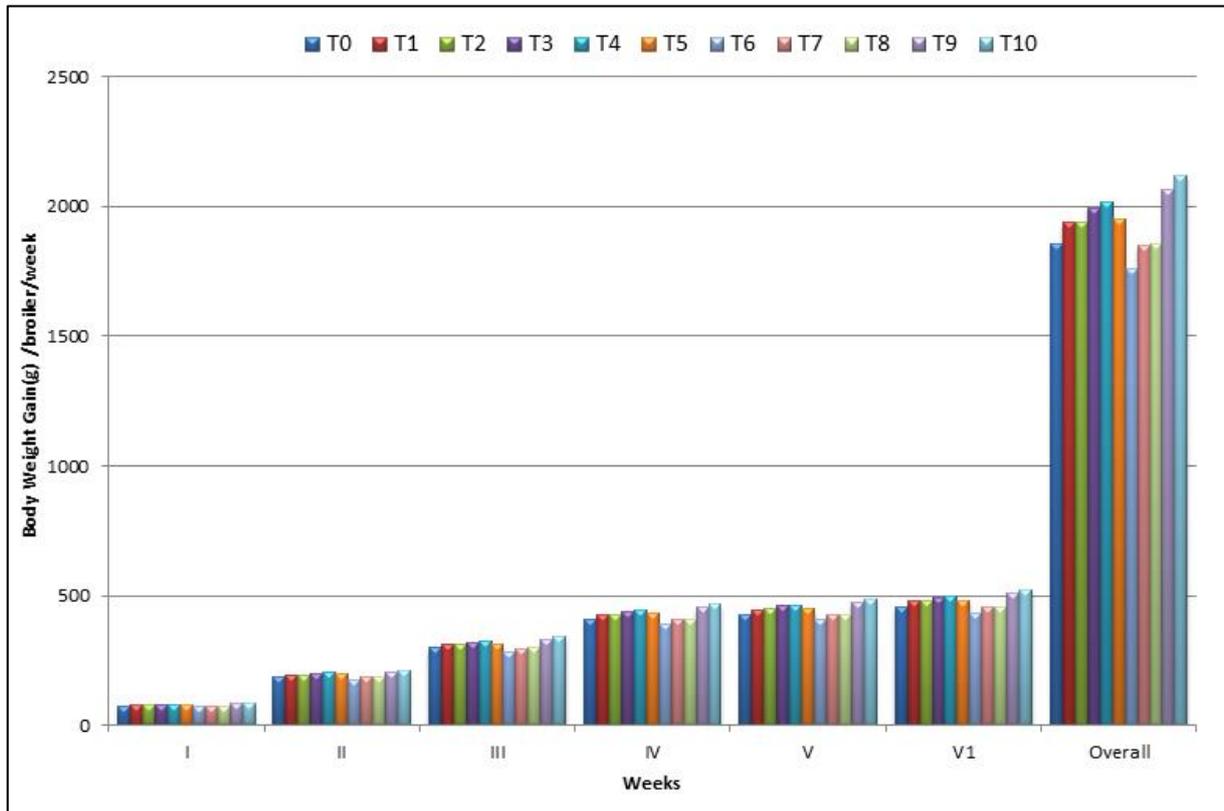


Fig 1: Effect of Feed Supplements on Body Weight Gain of broilers

Feed Intake

Average feed intake of broilers obtained at weekly interval as well as overall is presented in Table 2 and Fig. 2.

Starter Phase

During the starter phase the feed intake of broilers reduced significantly in the treatment groups in comparison to control except T₆ whereas it increased significantly in T₇ and T₈ groups.

Finisher Phase

Similar trend in feed intake was observed in finisher phase also with significantly reduced feed intake in all treatment groups in comparison to control except T₆ whereas it increased significantly in T₇ and T₈ groups.

Overall Feed Intake

The overall (I- VI week) mean values for feed intake of broilers were 3982.88 ± 31.33, 3758.36 ± 2.43, 3725.00 ±

10.13, 3787.46 ± 0.62, 3738.57 ± 2.07, 3588.37 ± 5.34, 3978.50 ± 0.56, 4122.38 ± 0.07, 4124.32 ± 28.87, 3735.66 ± 0.87 and 3795.34 ± 10.15 g in T₀ to T₁₀ groups, respectively. The overall feed intake at the end of 6 week of age showed significantly lower values in all the groups as compared to control group except T₇ and T₈ groups. The maximum feed intake of 4124.32 ± 28.87 g was observed for T₈ group where the diet had 3% less energy + liver stimulant II (X- liv Pro)@ 0.5g per kg feed followed by T₇(4122.38 ± 0.07). The Minimum feed intake of 3588.37 ± 5.34g (9.90 % less than control) was observed in broilers of T₅ group where emulsifier (Lipigon) was added in the diet. There were no significant differences in feed intake among T₀ and T₆; T₁, T₂, T₃, T₄, T₉ and T₁₀; T₇ and T₈ group of broilers. These findings were similar to Momtazan *et al.*, (2011) [9] who reported significant reduction in feed intake in enzymes and probiotics supplemented groups of broilers. Yadav *et al.*, (2018) [10] observed significant reduction in feed intake in broilers supplemented with probiotic (*Bacillus subtilis*).

Table 2: Effect of Feed Supplements on Feed Intake of broiler chickens

Treatments	Feed Intake (g) / Broiler / Week						Overall
	Starter			Finisher			
	I	II	III	IV	V	VI	
T ₀	120.65 ^a ± 0.56	319.47 ^a ± 0.48	558.40 ^a ± 0.51	837.54 ^a ± 0.57	1010.19 ^a ±11.12	1136.63 ^a ± 0.82	3982.88 ^a ± 31.33
T ₁	113.57 ^b ± 0.69	301.82 ^b ± 0.63	527.62 ^b ± 0.78	790.48 ^b ± 0.64	935.37 ^b ± 2.18	1089.50 ^b ± 0.55	3758.36 ^b ± 2.43
T ₂	112.63 ^b ± 0.64	299.36 ^b ± 0.82	522.56 ^b ± 0.69	783.66 ^b ± 0.75	910.69 ^b ± 10.36	1096.10 ^b ± 0.75	3725.00 ^b ± 10.13
T ₃	114.52 ^b ± 0.49	304.60 ^b ± 0.84	531.47 ^b ± 0.62	796.51 ^b ± 0.74	937.70 ^b ± 4.75	1102.66 ^b ± 0.73	3787.46 ^b ± 0.62
T ₄	112.66 ^b ± 0.44	299.50 ^b ± 0.76	522.86 ^b ± 0.56	783.64 ^b ± 0.63	932.49 ^b ± 0.34	1087.02 ^b ± 0.40	3738.17 ^b ± 2.07
T ₅	108.39 ^c ± 0.40	288.42 ^c ± 0.80	503.74 ^c ± 0.73	754.79 ^c ± 0.68	918.57 ^b ± 14.38	1014.46 ^c ± 0.62	3588.37 ^c ± 5.34
T ₆	120.42 ^a ± 0.67	319.43 ^a ± 0.76	557.73 ^a ± 0.60	836.56 ^a ± 0.71	1009.88 ^a ± 0.36	1134.48 ^a ± 0.63	3978.50 ^a ± 0.56
T ₇	124.84 ^d ± 0.65	330.83 ^d ± 0.59	578.65 ^d ± 0.82	866.81 ^d ± 0.63	1010.04 ^a ± 0.41	1211.21 ^e ± 0.48	4122.38 ^d ± 0.07
T ₈	124.84 ^d ± 0.64	330.90 ^d ± 0.54	578.29 ^d ± 0.52	867.24 ^d ± 0.62	979.04 ^c ± 26.98	1244.01 ^e ± 0.82	4124.32 ^d ± 28.87
T ₉	113.62 ^b ± 0.83	299.84 ^b ± 0.57	523.92 ^b ± 0.55	785.38 ^b ± 0.50	940.87 ^b ± 4.01	1072.03 ^b ± 0.75	3735.66 ^b ± 0.87
T ₁₀	114.69 ^b ± 0.64	304.59 ^b ± 0.67	532.72 ^b ± 0.75	798.63 ^b ± 0.84	941.82 ^b ± 3.78	1102.89 ^a ± 0.69	3795.34 ^b ± 10.15

Means bearing different superscripts in a column differ significantly (P<0.05)

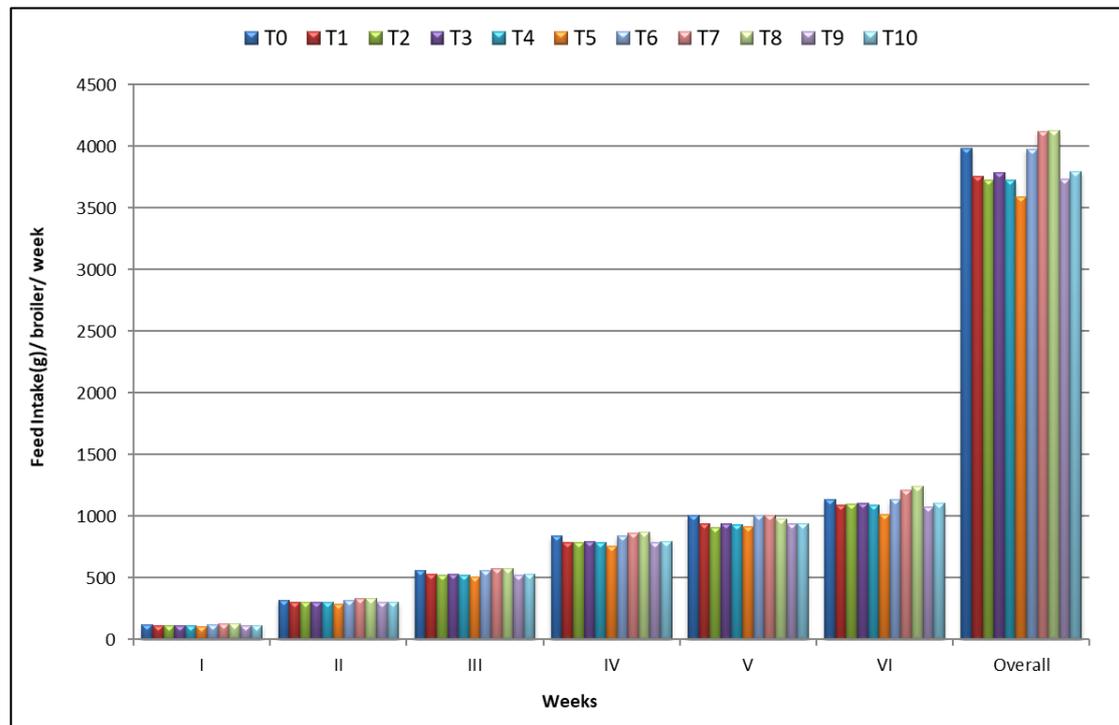


Fig 2: Effect of Feed Supplements on Feed Intake of broilers

Conclusion

It may be concluded from the results obtained from the study that the supplementation of chicks with Probiotics + Enzymes (Brozyme - XPR) + Emulsifier (Lipigon) + Liver Stimulant I (Superliv premix) @ 0.5g/kg feed improved the performance of broilers in terms of growth and feed efficiency. Increase in body weight gain and decrease in feed intake causes more income generation.

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